POPULAR MECHANICS

An Illustrated Weekly Review of the Mechanical Press of the World

"Tells you how to do things." Written so you can understand it.

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Wrecking of Brooklyn's Great Elevators

Watered Stock and Extortion Ruined the Eastern Grain Business and the Elevators Have Gone West

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LOBSTERS MAY SOON BE EATEN BY ALL.

Ocean's Sweetest Delicacy to Be Admitted Free from Newfoundland.

Everybody may soon be able to afford lobster. No longer will the toothsome, white meated, sweetest tasting of all the crustacea be denied the palates of the poor. A treaty providing for reciprocity between the United States and Newfoundland, the greatest lobster producing country, has been signed. Newfoundland lobsters are to be admitted to the United States duty free. This will be joyous tidings to epicureans throughout Uncle Sam's domains as well as to the day laborer who has a taste above the "hashery" himself, but whose means would never permit him to afford such a delicacy. This welcome information comes also just at the time that the American lobster is threatened with extermination. But for this treaty the average American of the next generation would hardly know what a lobster looks or tastes like and the delicacy would be confined exclusively to the tables of trust kings.

By the treaty Newfoundland concedes to American fishermen the privilege of buying bait on the same terms as Newfoundland. These are concessions of as great value to the New England fishing industry as any arrangement that could be made with Canada. Newfoundland agrees to admit free of duty several kinds of American machinery; to admit for duty lower than now charged nearly all American meats and breadstuffs.

AUTOMOBILES OF THE SEA.

Most Daring Command in the World is Prince Henry's Torpedo Boat Flotilla.

Probably the most daring organization of war in the world is the First Torpedo Boat Flotilla of the German navy, commanded by Prince Henry of Prussia. While many gallant officers and men have found a watery grave in the hazardous adventures performed by this fleet of little stinging midgets the experience and practical tests have resulted in the bettering of the construction until Germany now is the furthest advanced in torpedo boat work of any nation in the world. Fear of death or disaster seems to have been utterly cast aside by the gallant crews of the flotilla in their reckless maneuvers. If a boat is lost it simply proves that it is unseaworthy, that is all, and its type is improved upon by its constructors. These boats, because of the recklessness they have displayed and the fatalities that have resulted from their manipulation, have been termed the "automobiles of the sea." They ride the waves in the roughest weather and hence they might well be termed the "Rough Riders of the deep." It was during the adventurous maneuvers of this bold fleet that Duke Frederick Williams of Mecklenburg-Schwerin went down in his boat, the S. 26; in the maneuvers off Jutland, the Germans lost the torpedo boat S. 41; the gallant S. 85 met a similar disaster shortly afterward; Torpedo boat No. 76, a vessel of 150 tons, joined its comrades at the bottom of the sea only a short time ago, carrying to death one of its bravest officers; last July the S. 42 was run down and sunk at the mouth of the Elbe by the British Merchant Steamer Firsby, carrying with her the commanding officer and three of the crew; last April the Torpedo boat S. 32 collided with the schooner Odin off the Island of Moen. The schooner sank at once and the boat was badly damaged. These are only a few of the accidents that might be mentioned as resulting from the maneuvers of this fearless flotilla.

The torpedo boats that comprise the fleet of Prince Henry are built on the general principle of 185 feet of length to 21 feet beam.

There were 50,000 births in Chicago last year.

GREAT TIN DISCOVERY IN ALASKA.

Found Near Cape Nome, 80 Per Cent Pure, and in Overwhelming Quantities.

No longer will the report of the geological survey in its report on American resources read "Tin None." There is tin in American soil—abundance of tin—enough to supply the entire needs of the nation, it is said, with plenty to spare. From far-away Cape Nome comes this cheering information; from Alaska, the land for which Uncle Sam paid to Russia the paltry sum of $7,000,000 and which has proven the greatest bargain in history. Near Cape Nome has been discovered a tin ledge that promises to make America one of the greatest tin producing countries in the world. One thousand pounds of the tin are soon to be brought to New York and Chicago as a sample. It is 80 per cent pure and is so deep and bountiful in quantity that it can be most profitably worked.

A few weeks ago Popular Mechanics commented on the absence of any tin mines in America. Since 1898 the Geological survey has reported "no tin." Before that time the output was insignificant, although large sums were spent in an effort to get the metal from the Black Hills. It was too shallow there to be profitably worked, however, and the machinery that was set up has gone to rust and the mining stock is waste paper.

A. H. Craig, of Mukwonago, Wis., author of Common School Question Book, in a communication to Popular Mechanics, commenting on this new discovery of tin says: "You would scarcely believe me if I should give a true statement of the tin discoveries in that far-away region. I have known of the existence of tin in Alaska for more than a year, but not until recently was the quantity determined. It is only a question of a little time when this tin will be mined in sufficient quantities to supply all our needs and we shall be independent of any other country."

ART TREASURES DUG FROM THE BOTTOM OF THE SEA.

A wealth of the most magnificent bronze and marble statuary is being dug from the sea south of Cape Malea. The statuary is buried in the sand and was discovered by some sponge fishers. It is believed to be the priceless cargo of the ship mentioned in Lucan's Zeuxis, which was coming from the Temple of Delphi to Rome, when it foundered near Cape Malea and on the coast of the Island of Antikythera. It was loaded with splendid examples of the work of the finest Greek sculptors. Among the statues found is a Hermes in bronze, more than life-size and well preserved, believed to have come from the hand of Praxiteles; another in marble is believed to be a wrestler in the act of grappling with his opponent. It is the figure of a youth about the size of the Aegina gable figures and bending forward with an intensity far surpassing the "Wrestlers" in the Naples Museum. Prof. Rufus B. Richardson, of the American school of Classic Studies in Athens, says: "One of the most impressive parts of the collection is a row of bronze feet and a pile of bronze arms, which show that much more is still lying at the bottom of the sea. The divers are reported as saying all along that there were great and heavy bodies which they could not bring to the surface. But we shall have them ultimately."

ELECTRIC PROOF GARMENT.

Prof. Artemiev, Germany, has invented a garment woven from fine brass wire gauze which he claims is positive proof against the heaviest electric currents. He announces his willingness to submit himself to an alternating current of 150,000 volts. The scheme is pronounced dangerous by electricians.

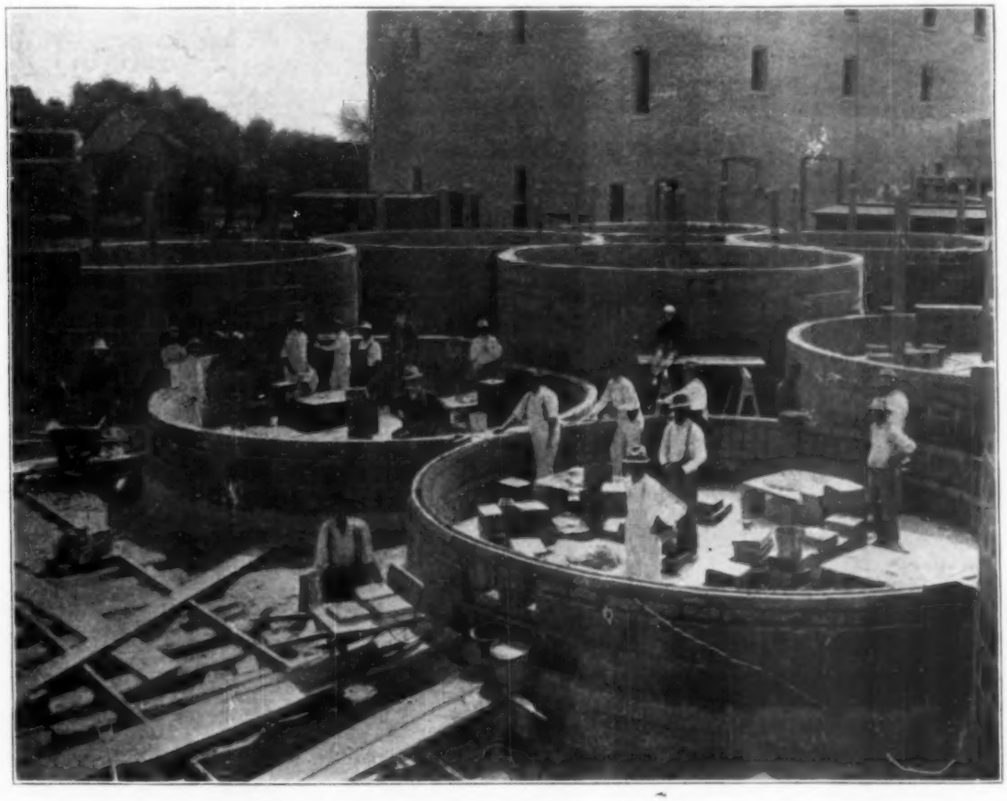
In towns in North Africa camels are much cheaper than horses and can be bought for $20 apiece.

Passing of the Eastern Elevator

Once Important Grain Storages Being Wrecked Because of Trust Influences

The passing of the Eastern elevator is marked by many such scenes as the one illustrated on the title page. Not longer than six years ago this structure was filled with grain to its utmost capacity, and all thereabout was a scene of great activity. It was the United States Iron Elevator, one of the once famous Brooklyn group, all of which are now being torn down. Six years ago the Brooklyn grain warehouses, with a capacity of 20,000,000 bushels, were filled and large storage charges were being earned. Steamers crowded the wharfs and passed up and down the harbor with heavy loads of grain.

But to-day there is a wonderful change. The once flourishing grain business has been destroyed by the trust's blighting hand. The former towering elevators are succumbing to the wrecker, just as is the one shown on the front page, and the iron is sold to junk dealers for $18 per ton.



Building the St. Anthony Elevator, Minneapolis.

The Grain Dealer's Journal says: A trust promoter named Thomas McIntyre seized upon the elevators and organized the Brooklyn Wharf & Warehouse Company, with the usual accompaniments of watered stock and exorbitant profits. The excessive charges made a difference against grain loaded at Brooklyn of 1⅛ cents per bushel compared with other ports. Exporters finally tired of this extortion and diverted their grain shipments to sea ports south and north."

But the loss to the East has been the West's gain. As fast as elevators are being torn down in New York and Brooklyn new ones are being built in different parts of the West. Eight new ones with a total storage capacity of 5,000,000 bushels have just been completed, and many others are in progress of construction. The accompanying illustration shows the building of the St. Anthony elevator at Minneapolis, said to be the largest absolutely fireproof elevator ever constructed. It consists of twelve tanks or bins erected in two rows, six tile tanks in each row, with a clear space of 30 inches between the tanks. The tanks or bins are 50 feet internal diameter and 90 feet in depth, with a storage capacity of 125,000 bushels of grain for each tank.

DURABLE MORTAR.

By using a special mortar which is so prepared as to render its tensile strength equal to that of the stone employed, Lorenc, of Prague, claims to produce masonry which is free from excrescence, fireproof, durable, and of such strength as to render the use of iron in the structure unnecessary. The mortar consists of a cement composed of water-glass, infusorial earth, and trass, to which Portland cement and sand are added. Other cements, lime, gypsum, etc., may be used instead of Portland cement. The building stone is soaked in water and saturated with a solution of water-glass containing infusorial earth before use, and the masonry, when completed, is painted over with the same solution, or with clay, or fluorides, as soon as the mortar has set. Hollow flat ceilings of considerable span can be built of stone with the mortar described, and openings can also be made in the main walls, or self-supporting walls of any span can be built without using ironwork.

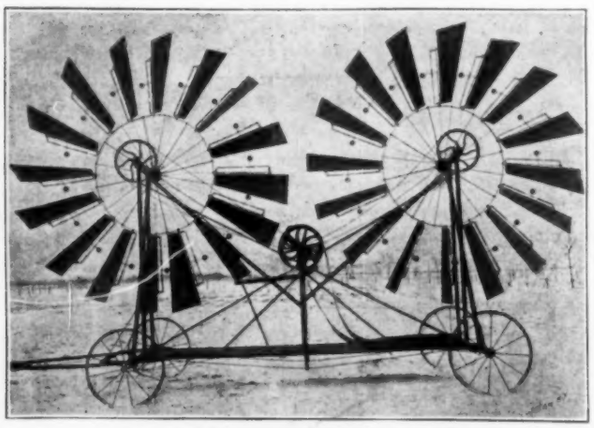
The government of New Zealand has offered a big prize to any one who before Jan. 1, 1904, will invent appliances to successfully save gold from the black sands of that country.

A shaft 6,000 feet deep is to be sunk at a copper mine in northern Michigan.

PROPELS WAGON BY PORTABLE WINDMILL.

Formidable Opponent of the Horse on the Farm Has Made Its Appearance.

Another opponent of the horse as a beast of burden has appeared. It is a portable windmill that some people say may do away with the horse for hauling purposes on the farm. As



"Farmer's Automobile" Propelled by the Wind.

the wind drives the mill the wagon speeds along at a lively gait, always, however, submissive to the control of the operator.

In the device shown in the accompanying illustration the upright frameworks are provided with bearings to receive the shafts of wind wheels. A system of braces stiffen and securely support the frameworks. In the center of the wagon is a standard in which is journaled a small sprocket connected by a chain with a sprocket carried in each windwheel shaft. A pulley in the central sprocket shaft receives a driving belt, which may be slipped over the pulley of any vehicle which it is desired to propel.

TRACTION ENGINE ON PACIFIC COAST FARMS

The traction engine and steam plows are gaining greatly in popularity on the Pacific coast. In a previous issue Popular Mechanics illustrated a great steam plow operating in California. The accompanying illustration shows a 50-horsepower traction engine pulling seven 8-foot randalls and seeders. These are familiar sights on the great farms of the far west. The engine and equipment is made by the Best Manufacturing company, of San Leandro, Cal.

HOW TO RAISE THE FINEST SUMATRA TOBACCO

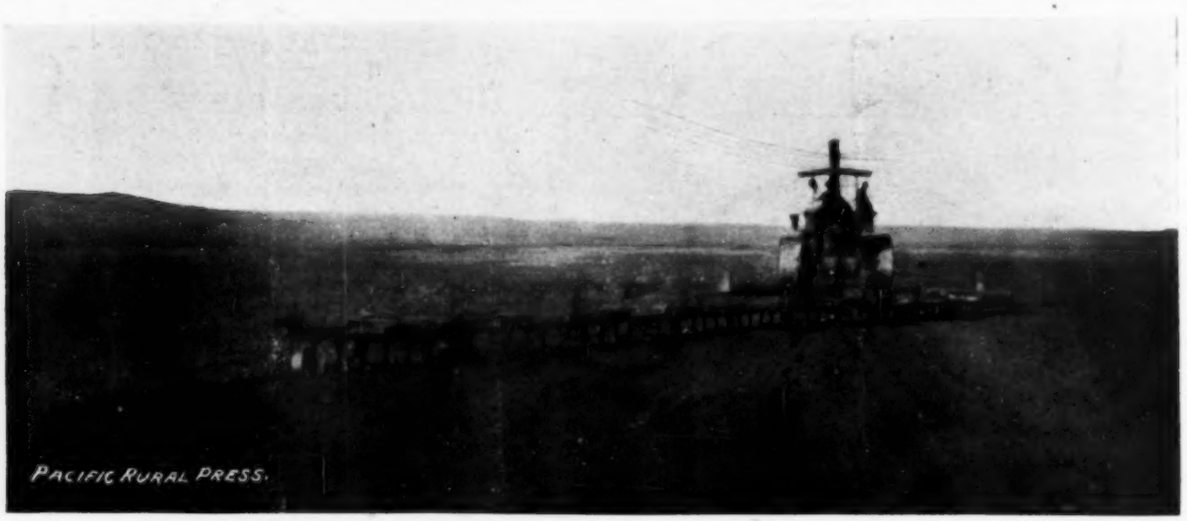
Growing It Under Cheese Cloth Makes It Equal to the Best Produced in the Tropics.

As the result of a new discovery by which the finest Sumatra tobacco grown may be raised in the United States, extensive preparations are being made for the cultivation of the leaf in Connecticut and other parts of the country the coming season. The secret of producing the high grade wrapper tobacco outside of the tropics consists of growing it under thin cheese cloth. It results from experiments by the Government Bureau of Soils. Such tobacco grown under cloth and lath shades secured an award at the Paris exposition. Later experiments have produced a still higher grade, that is considered equal to the very finest Sumatra, if not superior. The numerous firms who are preparing to engage in the new American enterprise this year are enthusiastic over the prospect of saving $1.85 a pound duty on Sumatra tobacco wrapper. This saving will enable them to go to considerable expense in growing their produce under cover and yet make a good profit.

Under the direction of an expert of the Government Bureau of Soils last year 18 acres of land in several parcels were tightly inclosed with cheese cloth stretched over a wire netting, supported on a frame work 9 feet high. Sumatra tobacco plants, a year old, were then transplanted into the soil beneath. The advantages of the covering, closed not only above, but also on the sides, were numerous and obvious. Many injurious insects were excluded, the force of strong winds was broken, the rain sifted through in a soft spray, the temperature averaged several degrees warmer, and was more uniform than outside, the hot sunlight was tempered and the atmosphere contained increased humidity. The plants grew in great luxuriance to the full height of the covering, and the leaves were peculiarly soft and fine. From 1,600 to 2,000 pounds of tobacco to the acre were harvested.

Florida, Louisiana, Texas and other Southern states have climates in which, it is believed, the tobacco could be grown to much better advantage than in the East.

The first locomotive to draw passengers in America was built by the West Point Foundry Co., of New York City, from designs furnished by Mr. Allen, then chief engineer of the Charleston & Hamburg railroad and was tested Dec. 14, 1830.



Powerful Traction Engine Pulling Randalls and Seeders.

A device for dosing cattle on laughing gas to make them feel merry while they are being slaughtered has been invented by Samuel Fox, a machinist of the Allis-Chalmers Co., Chicago.

THE EAGLE'S SHADOW ON CANADA'S SOIL.

Rush of Americans Northward Means the Ultimate Annexation of the Dominion.

The great rush of Americans into Canada is the beginning of the inevitable consequence that is to bring "Our Lady of Snows" into the great and growing family of Uncle Sam. Two movements are now under way for the taking of thousands of American farmers into the Dominion. Prior to the beginning of these movements, however, there was a well recognized rush to the north and Canada is now becoming Americanized faster than any of our new possessions. Besides the farms, there are railroads, factories, electric lines, great water power plants and other commercial pursuits being begun across the northern line by Americans. Many sleepy and picturesque scenes like the one shown in the accompanying illustration are giving way to manufacturing plants. Instead of the braying of the sheep at evening is heard the mechanic's saw and hammer.

Two million acres of Canadian land in Ontario is to be settled by the American Land Co., of which W. H. Utt, of Chicago, is solicitor, and J. F. Eagan, of Rock Island, president. An equal or greater amount of land in Manitoba is to be settled by another company. In Ontario alone 25,000,000 acres of good farming land awaits settlement. Thus the American may realize for the first time that his country has grown old; the tide is turning rom immigration to emigration.

Those who go from our country like the richness of Canadian soil, but also like the freedom of a republican government. They know and will explain to Canadians why it is that Canada's form of government has prevented her keeping pace with the United States in the race of nations; they will show them how unmanly it seems for people of a land so vast and resourceful as Canada to bow in allegience to a sovereign who sits on a little island in the ocean so far away. They will instill the principles of freedom, independence, self government and self pride in Canadians and thus the people will become Americanized and Canada will become great. Archbishop Ireland said:

"I do not want to be bellicose, but I say this for myself: As sure as fate, although you and I may not see it, the starry banner will wave mistress of all territory from the gulf to the bay. There will be no conquest, no war. The hearts across the border are already beating with love for us and commerce and agriculture are calling for espousals."

The picture herewith is of a scene near Grand Bend, Ontario. The land, it is said, is to be purchased by an American syndicate for the purpose of turning it into a town site.

Scenes to give way to Factories in "The American Invasion of Canada."

COAL DUST MAKES BIG SAVING IN FUEL.

Two stationary engineers of Toledo, O., have invented a device for using coal dust for fuel which, it is said, not only solves the problem of abating the smoke nuisance, but causes a saving of 30 per cent in the amount of fuel. The coal ground into fine dust is fed into the furnace much the same as planing mills do with shavings and saw mills with sawdust. The head of a big Cleveland firm that has placed the patent on the market says that a long study of the question has convinced him that it is impossible to get perfect combustion from burning coal of unequal sizes and that it is necessary to have the same degree of moisture. The new invention steam dries the coal, grinds it to a dust and then with the aid of fans, spray the dust into a firebox with just enough oxygen to produce instantaneous combustion.

In 1850 petroleum used to be dipped up from the surface of running water and sold under the name of "Rock Oil." It was regarded as a "natural remedy" with "wonderful medical virtues."

Australia proposes to send mails overland via the Trans-Siberian railway to Moscow and thence to England, which would effect a great saving of time.

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Popular Mechanics is an illustrated weekly review of the mechanical and engineering press of the world, presented in plain, simple language, and condensed as much as possible. We always credit publications from which illustrations and facts are taken. Where the name only of such publication is given, it indicates we have used practically the entire article. Where name of publication with date of issue is printed, we have made only a brief digest, and those of our readers who desire to study all the details of the subject should procure from its publishers, or their local newsdealer, the copy of that date

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THIS ISSUE 17,000 COPIES

Following is the record of new yearly paid subscribers received by POULAR MECHANICS during the past month.

WEEK ENDING	OCTOBER 25	472
"	NOVEMBER 1	534
"	NOVEMBER 8	886
"	NOVEMBER 15	907

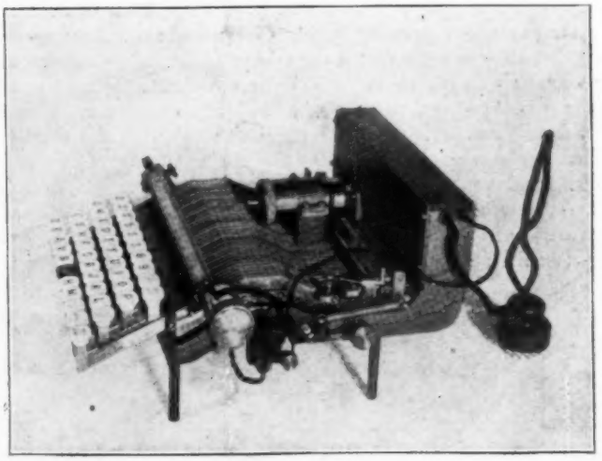
Advertisers are invited to examine our books at any time. We tell the exact truth about our circulation, and have nothing to cover up

MEANS THE DOOM OF PRESENT AMERICAN TELEGRAPHY.

Rowland Automatic System Is Adopted in Germany, and Our Slothful Method Must Give Way.

Recent advancements made by the Rowland Multiplex Printing Telegraph system of automatic telegraphy by the use of powerful alternating currents presage the doom of the present method of sending telegraph messages. Already Prof. Rowland's system has been adopted in Germany, and arrangements are under way for its extension into many other countries. The line now in operation extends from Berlin to Hamburg. Its success has been so great as to proclaim it the telegraphic wonder of the age. The sending device is shown in the accompanying illustration. Four operators may work at once at each end of a wire. They send the messages exactly as if they were writing on a typewriter. At the other end of the line the message is automatically printed on a slip or sheet of paper as it would have been had the operator been using a typewriter. The receiver has only to cut the messages from the sheets as they are wound out from the continuous roll.

The Electrical Age says: Type setting machines may be connected directly to the telegraph line and press dispatches set up in type automatically as they come over the wire. One wire between two large cities may have radiating branches at each end to eight different brokers' offices, in all 16 branches. They will all be able to use this wire at the same time, as if they had separate wires, and the communication will be secret, for it is impossible to mix up the messages as it is impossible



Apparatus that Sends the Message.

to "tap" a wire and steal messages sent by the Rowland system. In this "brokers" system will be found the nucleus of a general system, like that of our telephone systems, by which a subscriber may call up any other subscriber and communicate with him. Under such an extension of a telegraph system, a business man would be able to dictate a letter to his stenographer, who would call up "central," get his correspondent, telegraph the letter in letter form, printed and convenient to be filed for reference; the answer would be returned

Receiving the Message by Merely Cutting Off the Paper.

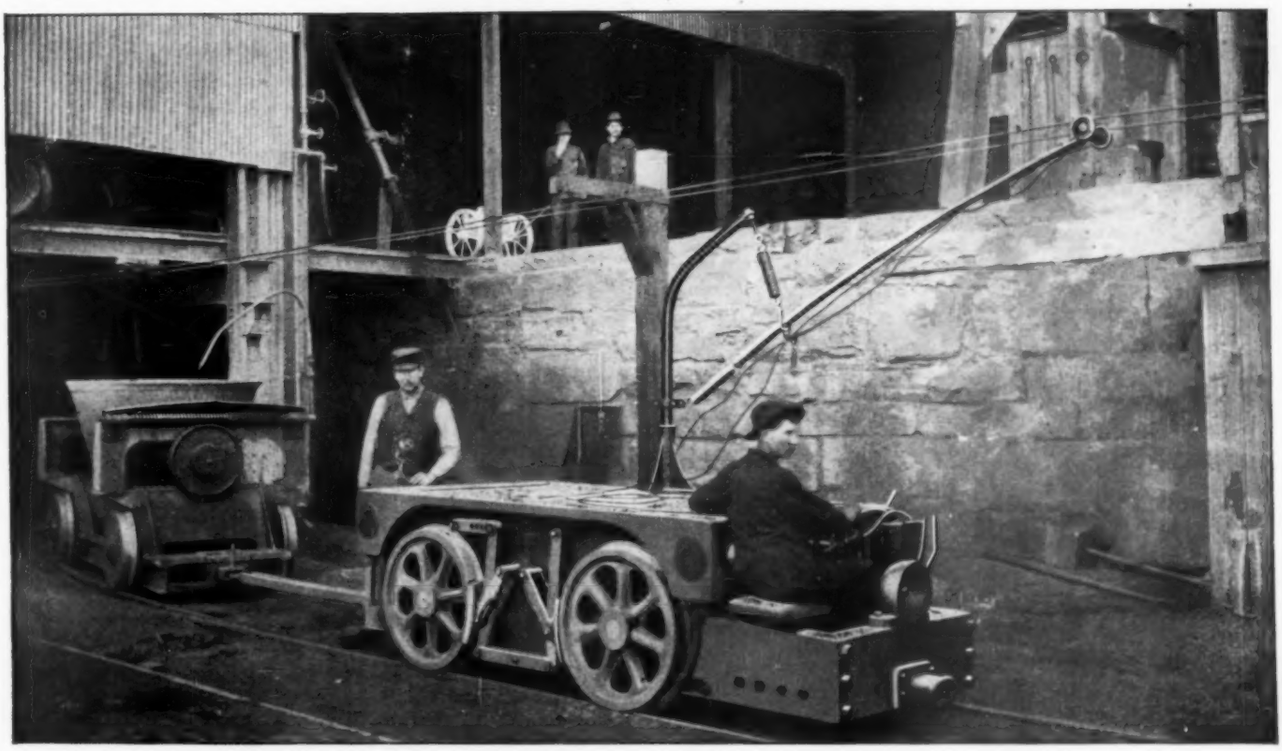
in the same way, the whole correspondence having the advantage of being recorded.

The inventor of this remarkable system was the late Henry A. Rowland, professor of Physics at Johns Hopkins university.

Adolf Dal claims that where peat cannot be used in factories on the spot it should not be transported, as costs will be near double those for carriage of coal; but power should be transmitted, either in the form of electricity or as peat gas.

The New York Central's "999" is said to be the handsomest, most graceful locomotive in the United States.

Electric Locomotive Development.--Part VI.

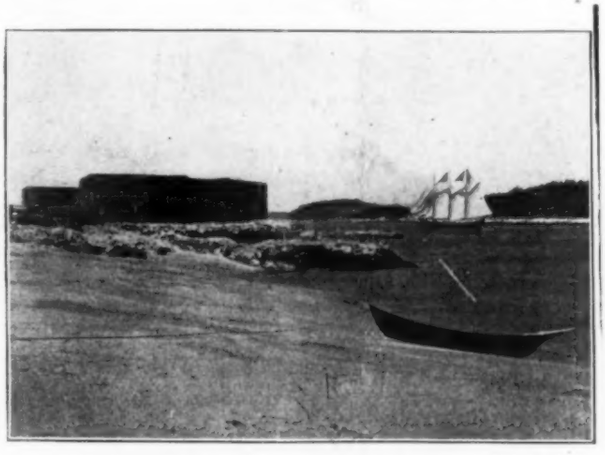


MINING TYPE ELECTRIC LOCOMOTIVE.—The above is another illustration to show the enormous extent to which Electrical Locomotives of every conceivable design are being used to supplant nearly all other kinds of power for surface haulage. This is a 4-ton locomotive built by the Baldwin Locomotive Works for the Tennessee Copper Company. It is used in charging furnaces and handling slag cars on a dump. It has proved itself capable of withstanding severe exposure to dust, water and the action of corrosive smelting gases.

FIRST SHIP BUILT IN AMERICA.

The Pinnace Virginia Was the Beginning of Our Present Great Fleet.

Popham Beach, Maine, enjoys the distinction of being the birthplace of the first ship ever built in America. It was called the Virginia and the materials for its construction were shipped over from England with colonists on The Gift of God and The Mary and John, sailing from Plymouth, Eng., June 1, 1607, and arriving Aug. 19 of the same year. Work was begun on the boat the next day after the arrival of the settlers. The builder was a Mr. Digby, a master shipbuilder of London. The launching took place the following spring. The boat was a pinnace of 30 tons, navigated with oars and two small sails. Light of draft and easy to handle it was of great service to the colonists in exploring the neighboring waterways and trading with the Indians. Besides its many expeditions of this kind it made two trips across the ocean, going to England with the colonists when they abandoned the settlement in the autumn of 1608, and returning with Sir George Somers' expedition in 1609. This little craft which seems insignificant to us in this day of floating palaces and colossal freighters, compared favorably in size with the vessels built in that day.



Where Our First Ship Was Built.

The Rudder says: "As the seed is to the harvest so is the tiny Virginia to the vast fleet of vessels of every name which plow the waters of remotest seas and carry the stars and stripes to the uttermost parts of the earth."

Popham Beach is a small village a dozen miles from Bath, Me., the town that has been called "the city of ships." Its inhabitants comprise probably a dozen families and its chief possession is a granite government fort.

Sir Philip Magnus, one of the foremost English engineering students, claims that training in applied science is responsible for Germany's remarkable commercial development while inattention to it is causing England's decline in manufacture.

In a beautiful valley in the very heart of the Rocky mountains in Colorado, inaccessible save through a narrow pass hidden with pines, a great herd of wild buffalo still roams at large, according to the claims of Colorado Game Commissioner Harris. The pass, he said, is known to no one but him.

Easy Electrical Experiments

By L. P. Dickinson

HOW TO MAKE AN ELECTRIC BELL.—PART II.

Having followed the directions given in the last chapter, the next thing is to mount the different parts of the bell in their proper places. For a bell, the amateur may have to dismantle an old alarm clock, the gongs upon these clocks answering admirably for the purpose. Sleigh-bells are sometimes made of the proper shape, or a suitable bell may be purchased at small cost. To mount the gong, fasten a stout wooden post in the

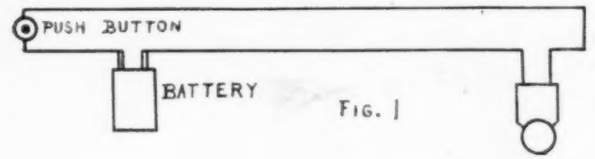


FIG. 1

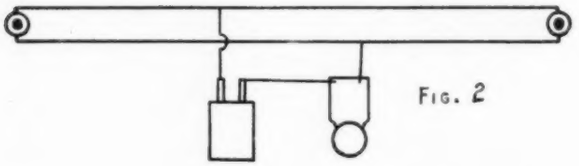


FIG. 2

center of the rounded end of the base board, the post being 5/8 inch in diameter and fastened to the board by a screw passing through the board and into the post. The post should be of such length that when the bell is placed with its center upon the center of the post, the edge of the gong is 1/4 inch from the base board. Fasten the gong in place by means of a screw passing through the bell and into the post.

Referring to the diagram given in the last chapter, the spring K is fastened to the block A by two screws. The strip F is screwed to the board at such a distance that the ends of the bolts lie very close to the strip H when the spring is against the screw S. Under these conditions, with the spring K pulling the armature away from the magnets with considerable force, the wire carrying the lead ball should be bent so that the ball is about 1/4 inch from the bell. One end of the coil of wire upon the spools is connected to a binding post at the top. The other end of the coil is connected to the spring K. The screw S is connected to the remaining binding post by a wire twisted firmly about it and soldered in place.

The different parts of the bell are now in place, and the bell is ready to work, except for adjusting. See that K presses firmly against S so as to make a firm contact. The armature H should then be about 1-16 inch from the lower limb of the magnet, and 1-32 inch from the upper end. Adjust the position of F until this is attained.

If a current should enter the bell at the upper left hand binding post, it would traverse first the coils surrounding the iron cores, thence to the spring K, to the screw S and back to the right hand post.

The iron cores become magnetized, and draw the armature H with its attached spring K, to the left. This breaks the circuit at S (if the bell is properly adjusted) and the iron cores lose their attraction for the armature, allowing the spring K to fly back against the screw S. This completes the circuit again, causing the armature to be attracted again. This is repeated very rapidly, the ball striking against the bell at each movement.

It is a mistake to make the spring K too weak, as this causes the hammer to move slowly and with little life. At each motion of the armature toward the magnets, the armature should barely touch the iron cores, before the ball strikes the bell. This gives a clear tone to the bell. Of course a brass or iron ball is better than a lead ball upon the wire N, but some amateurs cannot easily procure a brass ball, while any one can easily make a lead ball.

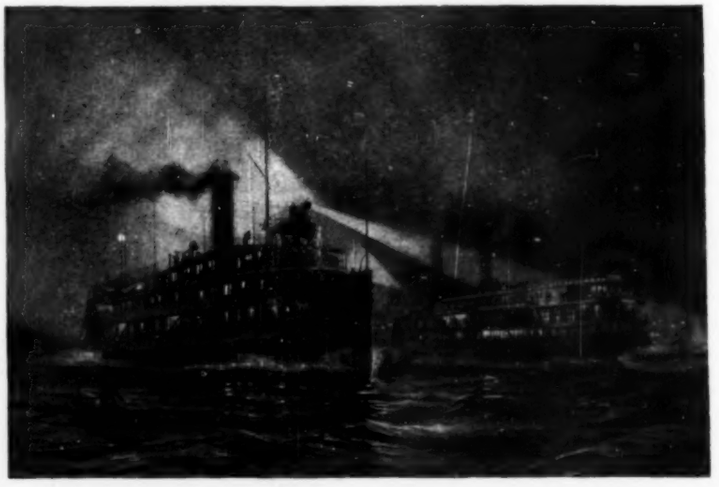
When it comes to wiring up the bell, the accompanying diagram may be of help. The push button had better be bought at an electrical supply house. For a short line one cell of battery should be sufficient. Fig. 1 shows how to wire the circuit using one push button. Fig. 2 shows how to wire for two push buttons. A home-made battery may be made from a quart fruit can, a zinc rod and four carbon rods. The latter are tied together and a wire is twisted around them at the top forming one plate of the battery. The zinc rod forms the other plate. The two plates dip into a strong solution of sal-ammoniac contained in the jar. Such a battery is not serviceable, however, except for short experiments.

After the bell is in working order, it is well to make a small box to serve as a cover for the working parts of the instrument. This, of course, must slip on over all parts except the bell, a slot being cut in the lower side to allow the wire N to pass through. This box may be made of pine, sandpapered smooth and stained with cherry or mahogany stain.

PRETTY SCENE IN THE DETROIT HARBOR.

With their powerful searchlights scanning the harbor and shore, band music from on board wafting its strains across the water, the decks crowded with merry young folks, laughing, shouting and waving their handkerchiefs as the boats gracefully glide out into the lake, it is a merry sight at Detroit during the departure of the two night boats of the Detroit and Cleveland Navigation Co. Both boats leave at the same hour, one for Cleveland and one for Mackinac, and it is at this time that the harbor is in its merryest, liveliest mood.

The searchlight since its introduction has come into general use on nearly all excursion boats and passenger liners as well as on war vessels, for which their use was originally intended.



Searchlight Scene on the Detroit River.

Every company that has employed them either on river, lake or seagoing vessels, have found them a source of great amusement to passengers and they have been well repaid for the expense in the increase of business.

The first stone of the great bridge to be laid across the Rhone river to unite Drome with Ardeche, was laid by President Loubet, of France, amid impressive ceremonies.

OIL THE FUEL OF THE FUTURE

Most Perfect Combustible Known, Is Sure to Supplant Coal for all Commercial Usage

Oil for fuel in locomotives and stationary furnaces in America is a certain and natural result of the late great discoveries in Texas. The time is not far away when there will be no more complaint of the high price of coal and keeping warm will be but an unimportant consideration even to the poorest of our land. Oil will supplant coal for heating purposes in all places except in the homes of the poorest who will use a good grade of coal because of its being so cheap. Already the oil burning locomotive and steamship have appeared and they are growing in popularity. Oil fuel under stationary boilers has been tested with flattering results. Just as coal supplanted wood as fuel is oil to supplant coal, but because of the abundance of coal in our country and the preference for oil as fuel, coal will never be as scarce and high as wood; it will continue in bounteous quantities, but will decrease many fold in price because of its inferiority.

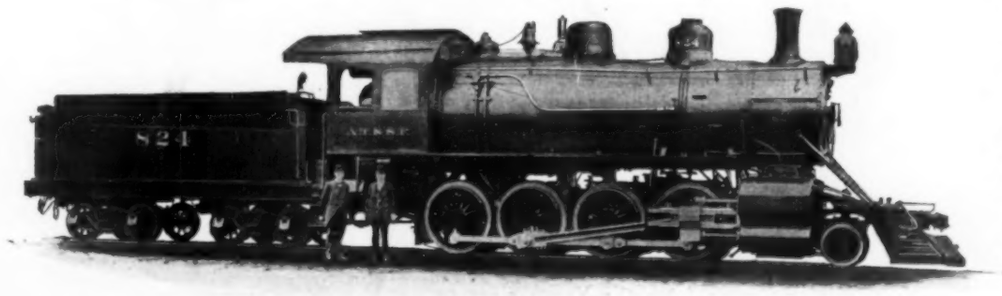
There are many great oil tanks under our soil that have never been tapped. Those that have been tapped now flow forth many times more oil than it has been possible to consume with our former meager facilities for using it. It could hardly be expected, however, that we should know how to use oil for fuel before we had the oil to use. But now the supply of this finest fuel yet known has been found in ample quantities. The way to use it advantageously and economically is resulting.

Oil might be called the concentrated essence of coal. Extract from coal all its combustible properties and throw away the waste and you will have oil, such as comes from the oil well, remaining. With oil, combustion is complete. There is no waste, no ashes, no cinders, no unburned gases, no escape of fuel through the grate or out the smokestack. The oil fuel industry is yet in its infancy. Its real economical value is not yet known as it has only been a very short time since we have commenced to experiment with oil burning apparatus. But even with present facilities it has been discovered that a pound of oil is equal to two pounds of coal for producing heat. One pound of oil is much less in bulk than even one pound of coal. Hence there is wonderful economy of space in carrying and storing the fuel. There is comparatively no waste of steam at the safety valve. With oil as fuel it is possible to work for days without raising the safety valve. There is great economy in the cost of cleaning engines because of the absence of smoke and cinders around the locomotive. No fires result from sparks, because there are no sparks from the oil burning locomotive. Passengers are not annoyed with cinders.

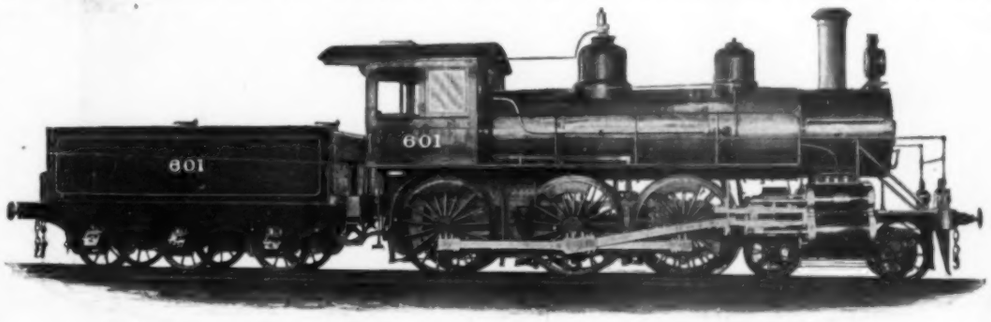
In Russia where oil has also been found in abundance for use as fuel it has already supplanted coal on many railway lines. All the locomotives on the Grazi-Tsaritzin railroad—143 in number—have abandoned coal for oil. The burner invented by Thomas Urquhart, which employs a jet of steam to break up the oil as it enters the firebox, is used on this line. The experiments conducted on that line before the adoption of the new fuel showed: "On 8-wheeled engines 45.83 pounds of petroleum per mile, costing 13 cents; on 6-wheeled engines 32.23 pounds of petroleum per mile, costing 9 cents. This was nearly half the cost of coal. As long ago as 1898 on the Los Angeles terminal railway, with locomotives burning Los Angeles oil at 75 cents per barrel, the cost per mile amounted to 11.1 cents as against 28.3 cents, the average cost of coal for the previous year.

The perfect oil burner has not yet been invented, but soon will be; present results are highly satisfactory, however, and experience and time will bring the perfect

Oil Burning Locomotive for Commercial Purposes.

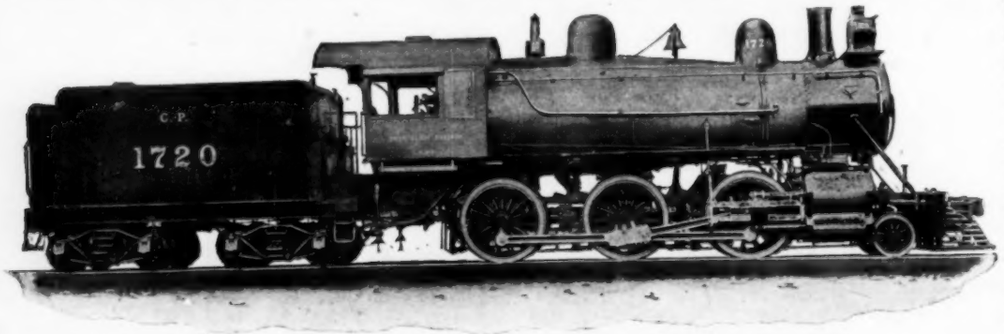


Heavy Consolidation Oil Burning Locomotive, A. T. & S. F. Railroad.



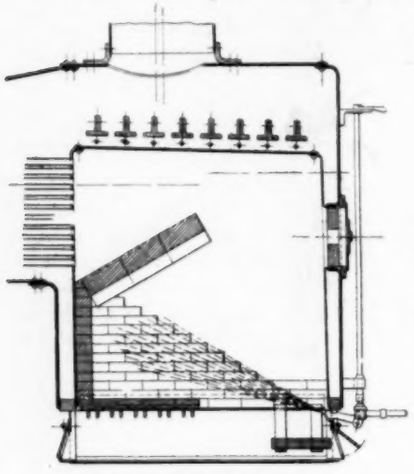
Ten-Wheel Passenger Locomotive Built by Baldwin Locomotive Works for the South Eastern Railroad of Russia.

burner. The Baldwin Locomotive Works have already built many locomotives for



Oil Burning Locomotive with Vanderbilt Boiler, built for the Southern Pacific Railroad.

oil burnnig; our illustrations show several prominent types that have given good results on the different roads in which they have been operated. The price of oil, since



Fire Box of Oil Burning Locomotive.

the great discoveries in Texas and California, is lower than ever before, and with the improved burner will come the universal adoption of oil as fuel on railroads, steamships and in manufacturing plants.

NAVIGATION ON THE UPPER MISSISSIPPI.

At midnight on Saturday, November 15, all the signal lights on the upper Mississippi, except those on draw bridges, were extinguished and the season of navigation was officially at an end.

The record at Winona shows a busy summer, 3,230 boats having passed that point, 1,001 barges and 940 rafts. Navigation began when the ice went out on March 9.

CLOCK THAT WILL RECORD 1-50 OF A SECOND.

MM. Hanger and Pescheux of Paris have invented a timing device which will time to a 50th of a second. It is attached to a fixed cylinder around which is wound white paper. The lapse of time is recorded by a pin moving around the cylinder, marking two inches to the second. The unit of record is the millimetre, which equals the fiftieth of a second.

"Dat were a very excitin' jackpot I won las' night on a bluff," said Mr. Erastus Pinkly as he lighted his cigar and dropped his hat over his eye.

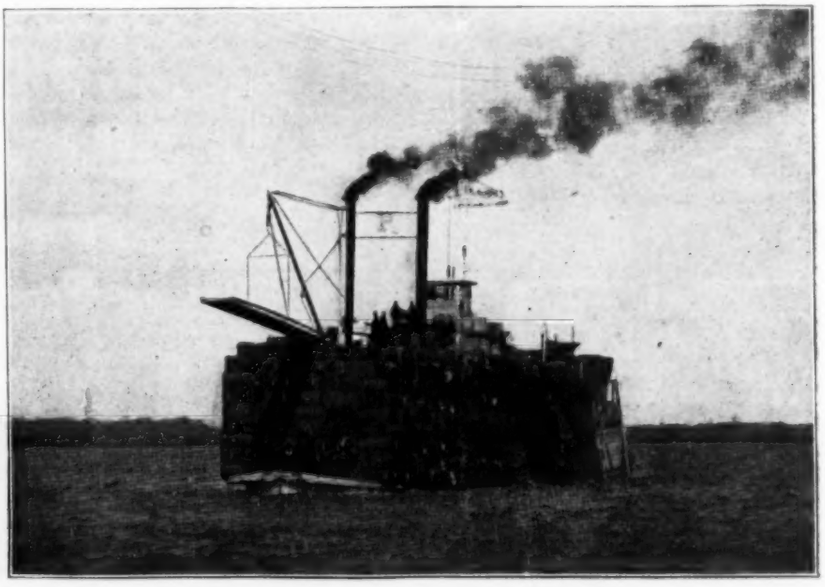
"Did you raise de opener?" asked Mr. James Colliflower.

"No, sur, I opened de razor."

BIG LOAD OF COTTON.

The steamers on the rivers of the South are now busily engaged in transporting cotton to the large shipping points. The illustration shows a typical Mississippi river boat, the Kate Robbins, which recently left Vicksburg for New Orleans with 1,010 bales of cotton on board. As will be seen she is loaded to the water's edge. Marine Engineering says:

Cotton is put on board the boats on the Mississippi river under difficulties that would seem insurmountable to those engaged in the steamboat freighting business in the North. The Kate Robbins on this trip came from the Yazoo river to Vicksburg and picked up her cargo along the banks in bales numbering all the way from one to fifty at each landing. There are no facilities whatever at the so-called landings. The steamer is run into the bank head-on, and the landing stage, which it will be observed, is hanging at the derrick on the boat, serves as the wharf. The colored roustabouts roll the cotton on board over this stage, and it is only by employing a large number of men of the don't-care-a-continental style of negro that the cotton is handled at all, and when the river is very high or low the loading of cotton is a very difficult operation. Not infrequently the rain is coming down in torrents, and the roustabouts work in mud half way to their knees.



Boat with more than a Thousand Bales of Cotton on Board.

MAIDS TO HOLD DIPLOMAS.

Serving maids in Chicago will in future be required to hold diplomas issued by the Chicago Housewives association in order to hold positions in the homes of members of the organization. The diploma will be granted to the maid only after she has been in one family for a year and has performed her duties with a certain degree of proficiency. Real parchment will be used and the holders will be described as "Satisfactory," "Good," or "Remarkably Efficient."

To ascertain the weight of cast copper find the number of cubic inches in the piece, multiply by 0.3146, and the product will be the weight in pounds.

J. W. Griggs says railway mergers were common prior to 1890.

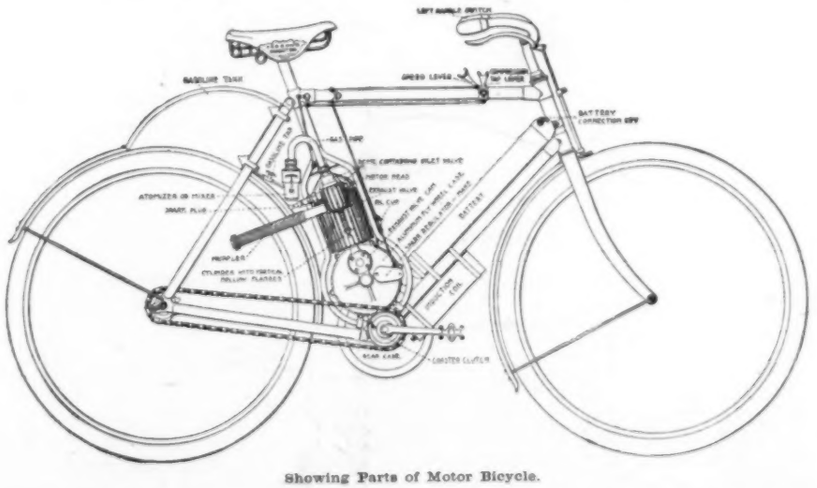
CAUSE OF EXPLOSIONS IN COAL MINES.

In the course of his address before the Canadian Mining Institute, W. D. L. Hardie, of Lethbridge, Alta, said:

By far the largest number of explosions on the American continent have occurred in dry and dusty bituminous coal mines, some of which gave off firedamp, while in others that have exploded never a sign of firedamp has been seen on a safety lamp, yet the lives lost in each of these mines count up in hundreds. In many of them I am skeptical as to whether there was any gas given off. I trudged round the East mine of the Southwest Virginia Improvement Co., Pocahontas, Va., and worked at the coal for over six months after the explosion there, in the vain hope that I would be able to find something that would indicate that there was some marsh gas present, but I never saw it. In the presence of several officials of the company and Andrew Roy, then the chief mine inspector of Ohio, I fired a heavy shot in a wide room where the coal was mined at least five feet deep. After such a shot a long tongue of red flame invariably shot out from twenty to thirty feet, and if the coal came down, flame at white heat played around behind the coal, in many cases dying out gradually, the last small flame presenting the blue cap. This only supported my idea of the distillation of the hydro-carbons in the coal dust. I have seen the same phenomena in most seams of a good coking quality. If marsh gas be present, forming a mechanical mixture with air, the phenomena will be intensified.

GASOLINE MOTOR BICYCLE.

Motor bicycles driven with a gasoline engine are becoming quite common. The



Showing Parts of Motor Bicycle.

illustration shows the arrangement of the machinery.

The man who is willing to help you is usually unable to help himself.

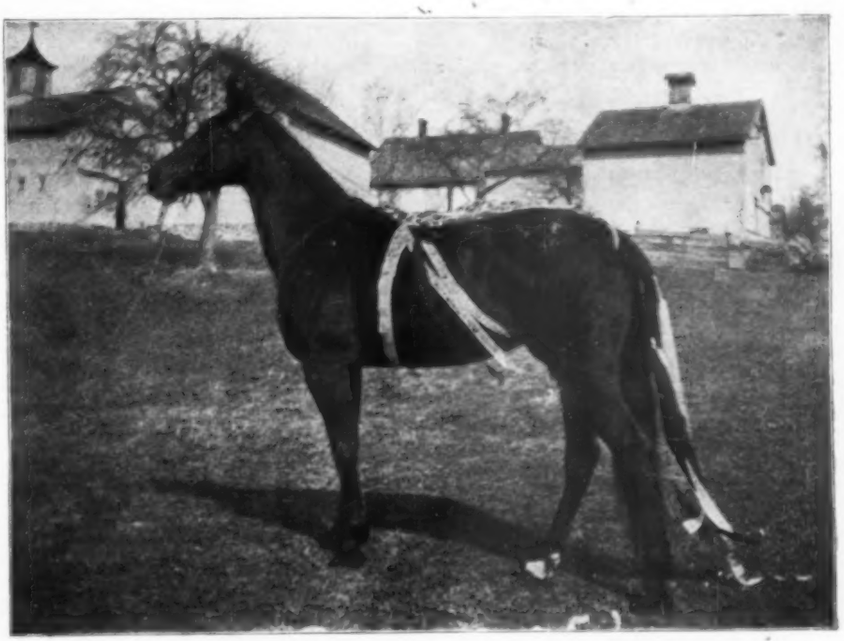
HAWAIIAN'S REMARKABLE DIVE.

A remarkable feat of a Hawaiian diver is told by a writer who states: "When the placing of a deep-water mooring had just been accomplished it became necessary to detach under water the end of a hawser, which had been made fast to the submerged part of a spar-buoy, about forty or fifty feet below the surface of the sea. The man was told to take his sheath-knife down with him and cut the hawser as near its end as he could, so as to lose as little as possible of the valuable cable. Taking his knife in his teeth, he disappeared beneath the water, and remained out of sight so long that he was almost given up for lost, when he suddenly reappeared, and, on being asked if he had cut the hawser as he had been told to, reported that he had unbent it without cutting off any part of it whatever.

HORSE THAT WINS RACES WITHOUT DRIVER.

Mrs. V. B. Strong's Mare "Cute" Paces All Alone and Lowers Records.

A pacing mare that wins races and lowers records without the aid of a driver is a phenomenon in horseflesh that is attracting great attention in the East. She is owned by a woman, Mrs. V. B. Strong, who holds the world's record as a woman driver. Mrs. Strong has reared and trained the mare by herself and each is devoted to the other. The mare is called "Cute, the Guideless Wonder." In races where other horses have been urged on by their drivers to their utmost speed, Cute, unaided by driver, bike, prompter or other incentive but her own ambition, has almost invariably crossed the wire far in the lead of her opponents. She is off with the word "go," cuts the corners short, reserves her strength for the homestretch, heeds not the plaudits of the grand stand as she leads her opponents in the finish, checks her pace when the line is crossed and returns to the starter to receive his caresses, and then parades before the grandstand as though she now rejoiced in the applause that was being given her. Cute broke the track record at Syracuse, N. Y., pacing a mile in 2:09 with the last quarter in 29 seconds, the fastest quarter mile ever paced by any horse on a half mile track. She paced a mile in 2:06 at Poughkeepsie, the fastest mile ever traveled over that track. She also lowered the record at Owego, Newburg and Orenburg, N. Y., at Johnstown, Pa., and many other places.



Cute, "The Guideless Wonder."

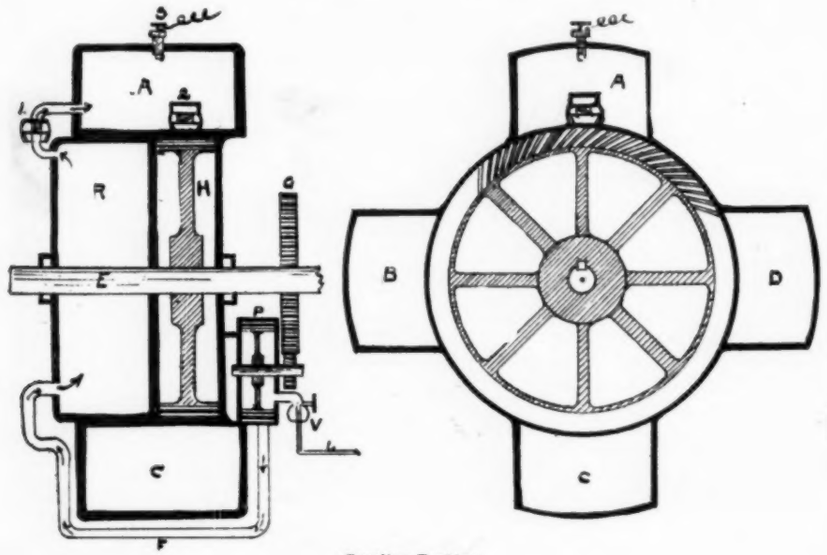
SHOP NOTES

A GASOLINE TURBINE.

Mechanics who are experimenting with gasoline turbine engines, for which there is a great future when perfected, will be interested in the results of a Mr. Crumb, whose device is illustrated herewith.

The Automobile Review says:

The machine consists principally of a hollow drum revolving in a stationary drum, each with vanes attached, so arranged that they clear each other, a rotatory pump and a vapor reservoir.



Gasoline Turbine.

Referring to the above cross sections, A, B, C and D are combustion chambers separated from the revolving drum H by the spring valve 2. R is an aluminum reservoir connected to each combustion chamber and to the pump P, by a copper pipe; the pump being driven by the gears G from the shaft E. Gasoline vapor is admitted to the engine through the vaporizer V, which is connected to the pump, and to the gasoline tank. Ignition is accomplished by the jump spark system, a plug S being screwed into each combustion chamber. A pair of gears and four cams control the sparking and may be adjusted to suit each chamber. These are not shown in the drawing, as the aim is to give a simple explanation of the principle of the machine.

On turning the shaft as when starting an ordinary engine, the pump P, which is geared to fifteen times the speed of the shaft E, takes gasoline vapor from the vaporizer and forces it through the pipe F into the reservoir R. When the vapor in the reservoir has reached 30 pounds pressure, this being the compression of an ordinary gas engine, the spring valve 1 admits the charge into the combustion chamber A, where it is fired by the plug S. The increased pressure opens the spring valve 2, which lets out the gas though the vanes, the action following being exactly the same as in a steam turbine. This operation is repeated consecutively in each combustion chamber.

The whole machine is water-jacketed, the water being led to the revolving drum by making the shaft E hollow.

These machines are not yet on the market, but the inventor states that a working model runs 1500 per minute without vibration, develops 2 h. p and weighs only 40 pounds. He believes that his machine performs the same work as a steam turbine of equal size working under 700 to 800 pounds pressure.

SWITCHBOARD POLISH.

For polishing white marble switchboards the following dressing may be applied with white flannel: Ten parts white wax, 2 parts Japan gold size and 88 parts turpentine.

The railway system in Natal is equipped throughout with motive power and rolling stock of British manufacture.

PREVENTING AND REMOVING IRON RUST.

To prevent iron from rusting, apply a strong solution of potassium bicromate with a brush and dry in an oven or over an open fire. Drying at ordinary temperature is not sufficient. To ascertain if the heat is strong enough, moisten the iron with a little water. So long as this takes up any color the heat must be increased, says the Wood Worker.

When the proper degree of heat is reached, a fine, deep, black layer results, which is not acted upon by water, and it protects the surface from the action of the atmosphere.

To remove rust from instruments, tools, etc., fill a basin or jar suitable for the occasion with a saturated solution of tin chloride in distilled water. Immerse the rusty instruments and let them remain over night. Rinse in running water, rub dry with a chamois, and they will be of a bright, silvery whiteness.

THE WATT.

The Watt, the unit of electrical power, is 1-746 of a horse-power. It equals the mechanical energy represented by 44.24 foot pounds. One ampere of current moving under the influence of one volt pressure, or any combination of volts and amperes, and that will make unity when multiplied together, is the equivalent, in the expenditure of energy to the work a man would do in lifting one pound 44.24 feet high, or any work, any weight raised any distance, in which the weight and the distance multiplied together make 44.24.

TRAY TO HOLD SCREWS.

A correspondent in the American Electrician tells how he made a very handsome device for holding screws.

The little tray shown in Fig. 1 is for the purpose of holding screws in position to be picked up by the screw-driver shown in Fig. 2. For the assembling bench I have found this tray and screw-driver to be of the greatest value.

If a box of screws be poured into the tray, and the latter shaken two or three times, every screw will fall into the grooves, head upward. If small brads are driven in the tops of the ribs (not shown in cut) the screws will fall into the grooves more readily. The screw-driver or "pick up," as I call it, is then pressed over a screw, the spring sides being stiff enough to hold the screw so it can be entered and screwed until pressure comes on; then the driver revolves part of a half turn, until the positive driving blade slips

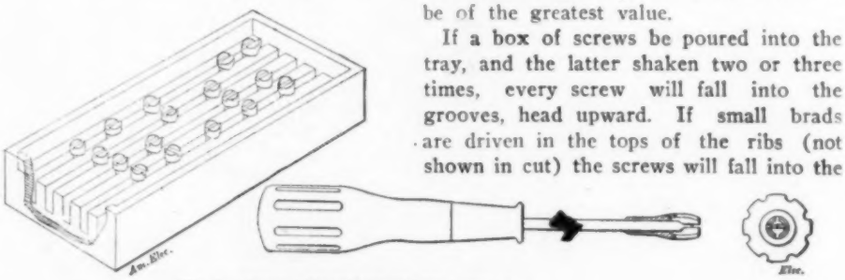


FIG. 1.—TRAY AND SCREW-DRIVER.—FIG. 2

into the slot of the screw-head, and a firm pressure can then be applied. I have used this outfit for some time assembling brush-holders, and have found it a great time-saver.

HOW MAHOGANY IS OBTAINED.

There are no forests of mahogany trees. They grow singly in the dense thickets of the tropics, never being found in groups. To locate them requires skill and experience. After a tree is discovered the next tedious work is felling it. This necessitates the labors of two strong men for a whole day. On account of the thick thorny growth near the base of the tree a scaffold is built around it, and above this at a height of from 10 to 15 feet, the tree is cut. Thus what is really the best part of the tree is lost. The felled tree is freed of its branches and hauled on a rough wagon drawn by oxen to the nearest river, where it is floated on a raft to a shipping point. The price of the wood runs from $140 to $200 per 1,000 feet.

TOOL FOR WORKING UP BOLT HEADS.

I have a useful tool for working bolt heads that are welded on, says a writer in the American Blacksmith. I take a piece of steel about 2¼ inches square, and fit one end into the square hole of the anvil. The top I split as shown in the illustration, to receive a one-inch rod. Then as you weld the bolt head on the

A USEFUL BOLT HEAD TOOL.

anvil you can lay it in this tool to smooth up the end, then back on the anvil to square the head, then in the tool to chamfer the corners.

Don't need no wings ter fly wid w'en dey
callin' er you higher—
No railroad on de rocky road en rough;
Don't want ter go ter glory in a cherryoot
er fire—
Kaze you sho' ter hit de fire soon
enough!

—Atlanta Constitution.

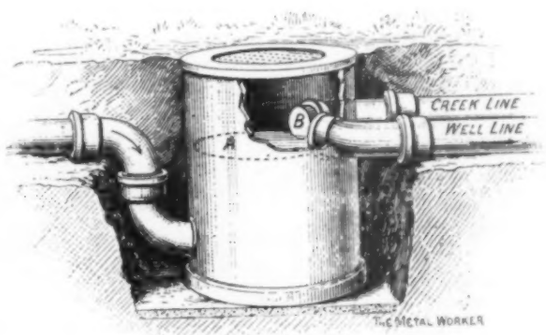
An axe combine with a capital of $41,000,000 is in prospect. Nothing is said, however, about cutting prices.

Before you cuss a machine and the cuss that made it, be sure you ought not rather to cuss the cuss that runs it.

SEWER WITH TWO OUTLETS.

The arrangement described herewith was used on a farm, where the sewer was discharging into a creek. During the summer the water was low in the creek and the current was not sufficient to keep the water pure for the stock, which drank from it. The Metal Worker illustrates the device which was adopted: In order to do this some special work was necessary, as there is no specific article for the purpose in the market. The sewer was broken at a point convenient to the well, and an improvised trap with two outlets was substitued for the regular house trap, previously used in the same line but nearer the house, as shown in the accompanying sketch. The chamber of the trap is a length of 20-inch vitrified pipe. It was tapped near the hub end to receive the line from the house and two holes for the outlets were made on the spigot side of the center of the length, about one-quarter of the circumference apart. The length was then set inverted in a bed of cement concrete, as shown. The house side was connected with two quarter bends, and the outlets with one ⅛-inch bend for each, the lines being parallel for a short distance. The hubs of the eighth bends were left inside the body, bedded in cement, and the bends cemented around outside. One-quarter bend tapped in at the sewer level with the spigot end projecting downward in the body would have answered for the inlet connection, but there were no long pattern bends at hand, and the short bends do not stick down far enough to make a good seal.

A sewer cap was placed over the top of the 20-inch pipe, the cover of which is easily lifted to change the plug from one outlet to the other, or to cleanse the trap. A tapering tarred wood plug was fitted so that it could be stuck into the end of either pipe, as indicated at B, thus causing the sewage to go either to the creek or the well at will. Sewage stands in the trap body as high as the bottom of the outlet pipes, as marked by the dotted line A. The regular intercepting trap nearer the house was removed, and a fresh air inlet put in its place. The holes in the trap cover and general leakage where it fits over the body are depended upon for a foul air outlet.



Showing the Construction.

The International Ax & Tool Co., formed by the consolidation of 27 companies, will control 95 per cent of the production in the United States and Canada of axes, adzes, hatchets, hammers, picks, mattocks, scythes, sickles, hickory handles and similar products and grind stone quarries, and will manufacture sufficient crucible and open hearth steel for the needs of the various plants.

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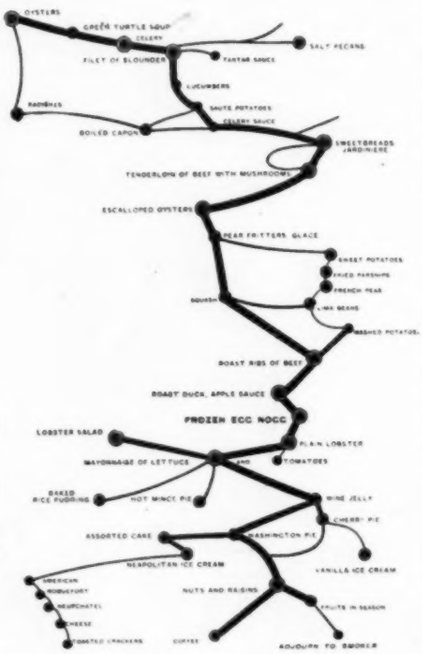
When the general passenger agents of the United States sat down to their annual banquet a unique menu card was laid



at each plate. Stops were made on the main line for the principal dishes and branches and side tracks included the rest. The Hotel World says the menu was designed by the Falmouth hotel at Portland, Me.

A superintendent of motive power, in a recent communication upon the subject of college men in railroad work, says: "It seems to me that too many young men are being developed along the line of locomotive work exclusively. I think that this is a mistake and that there is a big field opening up in car department work."—American Engineer.

USEFUL RECIPES FOR THE LADIES.

The Garment Dyers' Guide says: An easy way to take iron rust out of fabrics is to put stewed, unsweetened rhubarb on the spot after laying the goods on a plate. Ink can be taken out of linen by melting a piece of tallow and dipping the spotted part into it. Wash well and the spot will disappear.

To wash white China silk, make a strong lather of white soap and warm water. Rub the article in this and in a second lather, if very dirty, but do not rub soap on the silk. Rinse well in plenty of cold water, to which has been added a teaspoonful of paraffin to a gallon of the water. Wring in the hands, roll in a sheet, pass through the wringer and iron after it has stood about two hours.

"CHARM OIL" FOR CATCHING FISH.

In Fall River, Mass., there once lived an old man who was famed for the big catches he made when he went fishing. A young Englishman who accompanied him on several occasions discovered that he always saturated his bait in a kind of oil which he carried with him in a can. The oil was yellow and had a strong odor resembling geranium leaves.

"The old gentleman refused to tell what the liquid was composed of," says S. Everett in Forest and Stream, "and the secret died with him. My curiosity being aroused I visited a large wholesale druggist to see if he knew of such a thing as "charm oil." My visit was not in vain. A Frenchman had been searching for the same secret before me and between them they had made investigations and researches that I think have revealed the secret. Following is the formula:

"Oil rhudal, 1 part; oil copbia, 20 parts."

Oil of rhodium, obtained from a species of rose, is a well known scent which is in common use among trappers.

UNEARTH NEBUCHADNEZZAR PALACE.

A German exploring commission, now engaged in delving among the ruins of Babylon, is said to have unearthed what is supposed to be the audience chamber of Nebuchadnezzar. The building measures 156 feet long by 54 feet wide. The wall paintings and ornaments are well preserved. Several clay tablets, with Assyrian inscriptions, said to be psalms and contracts, have also been unearthed. The excavations are being vigorously prosecuted.

POWER USED IN THE U. S.

In the census report just issued it is stated there are 1,130,081 horse-power in use in the United States. This is divided as follows: Steam engines, 8,742,416 horse power; water wheels, 1,727,258 h. p.; electric motors, 311,016 h. p.; gasoline and gas engines, 143,850 h. p.; other forms, 54,490 h. p. The capacity of the 1,200 street railway power plants is over 1,000,000 h. p. Gas engines show the largest percentage of gain over ten years ago.

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